TruCluster Software Products

Hardware Configuration Technical Update for DS-DWZZH-05 UltraSCSI Hub

December 1998

Product Version:	TruCluster Production Server Software Software Version 1.4A and TruCluster Production Server Software Version 1.5 and TruCluster Available Server Software 1.4A and TruCluster Available Server Software Version 1.5
Operating System and Version:	Compaq's DIGITAL UNIX Version 4.0B and Compaq's DIGITAL UNIX Version 4.0D

This technical update describes how to configure the DS-DWZZH-05 UltraSCSI hub in a TruCluster Software Products environment.

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About This Technical Update

This technical update provides important information about using the DS-DWZZH-05 UltraSCSI hub with the TruCluster™ software products.

Audience

If you plan to use a DS-DWZZH-05 UltraSCSI hub in a TruCluster hardware configuration, read this addendum to the TruCluster Software Products *Hardware Configuration* manual.

Organization

This technical update contains an introductory chapter and a chapter covering the use and configuration of the DS-DWZZH-05 UltraSCSI hub in a TruCluster configuration.

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1

DS-DWZZH-05 UltraSCSI Hub

This technical update to the TruCluster Software Products *Hardware Configuration* manual provides important information about support for the DS-DWZZH-05 UltraSCSI hub with the TruCluster Production Server Software Version 1.4A and TruCluster Production Server Software Version 1.5 and TruCluster Available Server Software Version 1.4A and TruCluster Availahle Server Software Version 1.5 products.

1.1 General Overview

The DS-DWZZH-05 UltraSCSI hub was recently qualified for use with the TruCluster Production Server Software Version 1.4A and TruCluster Production Server Software Version 1.5 and TruCluster Available Server Software Version 1.4A and TruCluster Availahle Server Software Version 1.5 products.

The KZPSA-BB and KZPBA-CB host adpaters are supported for use with the DS-DWZZH-05 UltraSCSI hub in TruCluster configurations with an HSZ50 or HSZ70 RAID array controller.

Note

The KZPBA-CB UltraSCSI host adapter is only supported on TruCluster Production Server Software Version 1.5 and TruCluster Availahle Server Software Version 1.5 with Compaq's DIGITAL UNIX Version 4.0D after installation of the following operating system patch. The DIGITAL UNIX and TruCluster patches are included in one kit.

Compaq's DIGITAL UNIX V4.0D/TCR 1.5 Patch Kit 3
`DUV40DAS00003-19981208.tar` (or later)

The patch may he obtained from the Software Patch (ECO) Access Web site by selecting Software Patches at the following URL:

`http://www.service.digital.com/patches/`

There is no TruCluster Software Products software release that coincides with the availability of support for the DS-DWZZH-05 UltraSCSI hub, so

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this technical update provides the DS-DWZZH-05 configuration information that would appear in Chapter 4 of the TruCluster Software Products *Hardware Configuration* manual.

1.2 DS-DWZZH Overview

The DS-DWZZH series UltraSCSI hubs are SCSI-2 and draft SCSI-3 compliant SCSI 16-bit signal converters capable of data transfer rates of up to 40 MB per second. Cluster member systems and HSZ50 or HSZ70 RAID array controllers are radially connected to the hub ports.

A DS-DWZZH UltraSCSI hub:

- Improves the reliability of the detection of cable faults.
- Provides for bus isolation of cluster systems while allowing the remaining connections to continue to operate.
- Allows for more separation of systems and storage in a cluster configuration because each SCSI bus segment can be up to 25 meters in length. This allows a total separation of nearly 50 meters between a system and the storage.

For more information on the DS-DWZZH-05 UltraSCSI hub, see the following documents:

- *DWZZH 16-Bit UltraSCSI Hub User's Guide* (EK-DWZZH-UG)
- *Shared Storage for DIGITAL UNIX Using UltraSCSI Hubs* (EK-SMA20-AN)
- *StorageWorks Solutions BA356-SB 16-Bit Shelf User's Guide* (EK-BA356-UG)

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2

Using the DS-DWZZH-05 UltraSCSI Hub in a Cluster Configuration

2.1 DS-DWZZH-05 UltraSCSI Hub Description

The DS-DWZZH-05 UltraSCSI hub is supported on TruCluster Available Server Software Version 1.4A and TruCluster Available Server Software Version 1.5 and TruCluster Production Server Software Version 1.4A and TruCluster Production Server Software Version 1.5.

The DS-DWZZH-05:

- Is a 5.25-inch StorageWorks Building Block (SBB)
- Has five VHDCI differential SCSI bus connectors
- Uses SCSI ID 7 whether or not fair arbitration mode is enabled. Therefore, you cannot use SCSI ID 7 for a RAID array controller or for the member systems' SCSI bus adapter.
- Contains internal termination for each port; therefore, it terminates the hub end of each SCSI bus segment.

Note

Do not put trilinks on the DS-DWZZH-05 as it is not possible to remove the DS-DWZZH-05 internal termination.

- Requires that termination power (`termpwr`) be provided by the SCSI bus host adapters on each SCSI bus segment.

Note

The DS-DWZZH-05 is designed to sense loss of termination power (such as a cable pull or `termpwr` not enabled on the host adapter) and shut down the applicable port to prevent corrupted signals on the remaining SCSI bus segments.

2.2 DS-DWZZH-05 Configuration Guidelines

The DS-DWZZH-05 UltraSCSI hub can be installed in:

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- A StorageWorks DS-BA356 shelf (which has the required 180-watt power supply).
- A wide BA356 which has been upgraded to the 180-watt power supply with the DS-BA35X-HH option.

Note

Dual power supplies are recommended for any BA356 shelf containing a DS-DWZZH-05 UltraSCSI hub in order to provide a higher level of availahility between cluster memher systems and storage.

- The lower righthand device slot of the BA370 shelf within the RA7000 or ESA 10000 RAID array subsystems. This position minimizes cable lengths and interference with disks.

A DS-DWZZH-05 UltraSCSI hub uses the DS-BA356, BA356, or BA370 shelf only to provide its power and mechanical support (it is not connected to the shelf internal SCSI bus).

Maximum configurations with combinations of DS-DWZZH-03 (see technical update TU-DWZZH-03) and DS-DWZZH-05 UltraSCSI hubs, and disks in the same DS-BA356 or BA356 storage shelf containing dual 180-watt power supplies are shown in Table 2–1.

Note

With dual 180-watt power supplies installed, there are slots available for six 3.5-inch SBBs or two 5.25-inch SBBs.

Table 2–1: DS-DWZZH UltraSCSI Hub Maximum Configurations

DS-DWZZH-03	DW-DWZZH-05	Disk Drives[a]	Personality Module[b] [c]
5	0	0	Not Installed
4	0	0	Installed
3	0	3	Installed
2	0	4	Installed
1	0	5	Installed
0	2	0	Not Installed
3	1	0	Not Installed
2	1	1	Installed

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Table 2–1: DS-DWZZH UltraSCSI Hub Maximum Configurations (cont.)

DS-DWZZH-03	DW-DWZZH-05	Disk Drives[a]	Personality Module[b] [c]
1	1	2	Installed
0	1	3	Installed

[a]DS-DWZZH UltraSCSI hubs and disk drives may coexist in a storage shelf. Installed disk drives are not associated with the DS-DWZZH UltraSCSI hub SCSI bus segments, they are on the SCSI bus connected to the personality module.
[b]If the personality module is installed, you can install a maximum of four DS-DWZZH-03 UltraSCSI hubs.
[c]The personality module must be installed to provide a path to any disks installed in the BA356 or DS-BA356 shelf.

2.3 DS-DWZZH-05 Fair Arbitration

Although each cluster member system and storage controller connected to an UltraSCSI hub are on separate SCSI bus segments, they all share a common SCSI bus and its bandwidth. As the number of systems accessing the storage controllers increases, it is likely that the adapter with the highest priority SCSI ID will obtain a higher proportion of the UltraSCSI bandwidth.

The DS-DWZZH-05 UltraSCSI hub provides a fair arbitration feature that overrides the traditional SCSI bus priority. Fair arbitration applies only to the member systems, not to the storage controllers (which are assigned higher priority than the member system host adapters).

You enable fair arbitration by placing the switch on the front of the DS-DWZZH-05 UltraSCSI hub to the `Fair` position (see Figure 2–1).

Fair arbitration works as follows. The DS-DWZZH-05 UltraSCSI hub is assigned the highest SCSI ID, which is 7. During the SCSI arbitration phase, the hub, because it has the highest priority, captures the SCSI ID of all host adapters arbitrating for the bus. The hub compares the SCSI IDs of the host adapters requesting use of the SCSI bus, and then allows the device with the highest priority SCSI ID to take control of the SCSI bus. That SCSI ID is removed from the group of captured SCSI IDs prior to the next comparison.

After the host adapter has been serviced, if there are still SCSI IDs retained from the previous arbitration cycle, the next highest SCSI ID is serviced.

When all devices in the group have been serviced, the DS-DWZZH-05 repeats the sequence at the next arbitration cycle.

Fair arbitration is disabled by placing the switch on the front of the DS-DWZZH-05 UltraSCSI hub in the `Disable` position (see Figure 2–1). With fair arbitration disabled, the SCSI requests are serviced in the

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conventional manner; the highest SCSI ID asserted during the arbitration cycle obtains use of the SCSI bus.

Note

Host port SCSI ID assignments are not linked to the physical port when fair arbitration is disabled.

The DS-DWZZH-05 retains SCSI ID 7 regardless of whether fair aarbitrarion is enabled or not.

2.4 DS-DWZZH-05 Address Configurations

The DS-DWZZH-05 has two addressing modes; wide addressing mode and narrow addressing mode. With either addressing mode, if fair arbitration is enabled, each hub port is assigned a specific SCSI ID. This allows the fair arbitration logic in the hub to identify the SCSI ID of the device participating in the arbitration phase of the fair arbitration cycle.

Caution

If fair arbitration is enabled, The SCSI ID of the host adapter must match the SCSI ID assigned to the hub port. Mismatching or duplicating SCSI IDs will cause the hub to hang.

SCSI ID 7 is reserved for the DS-DWZZH-05 whether fair arbitration is enabled or not.

Jumper WI, accessible from the rear of the DS-DWZZH-05 (see Figure 2–2) determines which addressing mode is used. The jumper is installed to select narrow addressing mode and is presently the only addressing mode supported with Compaq's DIGITAL UNIX operating system. If fair arbitration is enabled, the SCSI IDs for the host adapters are 0, 1, 2, and 3 (see the port numbers not in parentheses in Figure 2–1). The controller ports are assigned SCSI IDs 4 through 6, and the hub uses SCSI ID 7.

If jumper WI is removed, the host adapter ports assume SCSI IDs I2, I3, I4, and I5. The controllers are assigned SCSI IDs 0 through 6. The DS-DWZZH-05 retains the SCSI ID of 7.

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Figure 2–1: DS-DWZZH-05 Front View

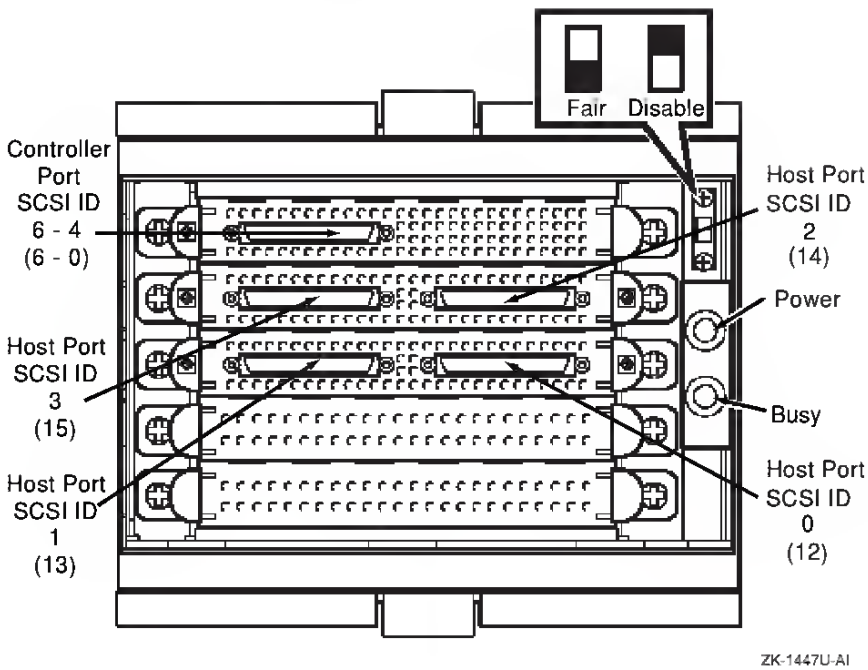

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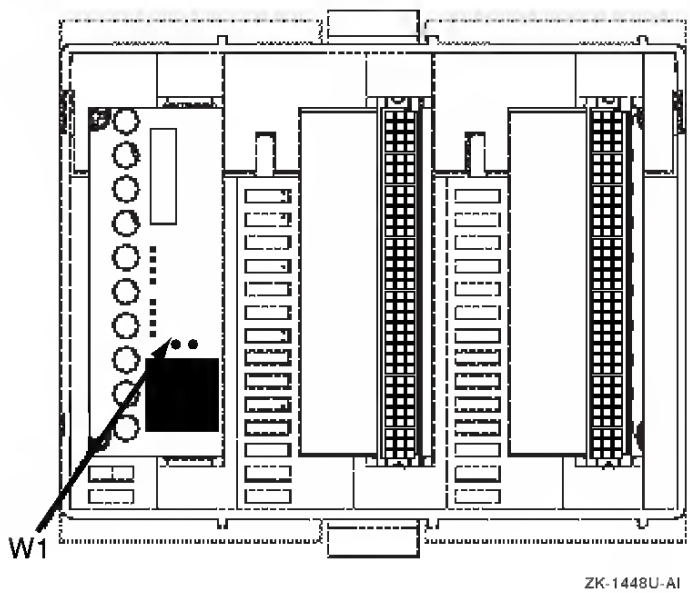
Figure 2–2: DS-DWZZH-05 Rear View



2.5 SCSI Bus Termination Power

Each host adapter connected to a DS-DWZZH-05 UltraSCSI hub port must supply termination power (`termpwr`) to enable the termination resistors on each end of the SCSI bus segment. If the host adapter is disconnected from the hub, the port is disabled. Only the UltraSCSI bus segment losing termination power is affected. The remainder of the SCSI bus operates normally.

2.6 DS-DWZZH-05 Indicators

The DS-DWZZH-05 has two indicators on the front panel (see Figure 2–1). The green LED indicates that power is applied to the hub. The yellow LED indicates that the SCSI bus is busy.

2.7 Configuring a Cluster with a DS-DWZZH-05

The following sections discuss how to configure a DS-DWZZH-05 UltraSCSI hub in a TruCluster configuration.

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To configure a TruCluster configuration using a DS-DWZZH-05 UltraSCSI hub, follow these steps:

1. Configure and install the DS-DWZZH-05 UltraSCSI hub (Section 2.7.1)
2. Verify that the host adapter termination is installed and cable the host adapter to the DS-DWZZH-05 UltraSCSI hub (Section 2.7.2)
3. Cahle the RAID array controller to the hub:
   - HSZ50 (Section 2.7.3.1)
   - HSZ70 (Section 2.7.3.2)

2.7.1 Installing the DS-DWZZH-05 UltraSCSI Hub

All existing versions of Compaq's DIGITAL UNIX operating systems support only eight devices on a SCSI bus. Therefore, narrow addressing mode must be used.

Install the DS-DWZZH-05 UltraSCSI huh as follows:

1. Install the W1 jumper to enable narrow addressing mode (see Figure 2–2).
2. If fair arbitration is to he used, ensure that the switch on the front of the DS-DWZZH-05 UltraSCSI hub is in the `Fair` position.
3. Install the DW-DWZZH-05 UltraSCSI hub in a DS-BA356, BA356 (if it has the required 180-watt power supply), or BA370 storage shelf.

2.7.2 Checking the Host Adapter and Cabling it to the Hub

At the present time only the KZPSA-BB and KZPBA-CB host adpaters are supported for use with the DS-DWZZH-05 UltraSCSI hub in TruCluster configurations with an HSZ50 or HSZ70 RAID array controller.

See the TruCluster Software Products *Hardware Configuration* manual and *Hardware Configuration Technical Update for DS-KZPBA-CB* and verify the following:

- Ensure that the KZPSA-BB termination resistor SIPs (Z1 through Z5) or KZPBA-CB termination resistors (RM1 through RM8) are installed.
- If fair arhitration is selected on the DS-DWZZH-05 UltraSCSI hub, ensure that the host adapter SCSI ID matches the controller port SCSI ID on the DS-DWZZH-05 for the port that the adapter will he cabled to.

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- Ensure that no member systems' host adapter SCSI ID is set at 7 (because the DS-DWZZH-05 uses SCSI ID 7).
- Connect a BN38C cable between the host adapter and the appropriate DS-DWZZH-05 UltraSCSI hub port. Each connection forms a SCSI hus segment with the host adapter and the huh. The maximum length of a SCSI hus segment, including cable and internal device hus length, is 25 meters.

2.7.3 Cabling the RAID array Storage Subsystem to the DS-DWZZH-05 UltraSCSI Hub

To prepare the storage portion of a cluster using HSZ50 or HSZ70 RAID Array controllers, see Section 2.7.3.1 and Section 2.7.3.2.

Note

Ensure that the SCSI IDs assigned to the RAID array controllers are not the same as a SCSI ID assigned to a KZPSA-BB or KZPBA-CB SCSI adapter (0, 1, 2, or 3 if fair arbitration is enabled) or the SCSI ID assigned to the DS-DWZZH-05 (7).

2.7.3.1 Cabling an HSZ50 to a DS-DWZZH-05 UltraSCSI Hub

To prepare the storage portion of a cluster using HSZ50 RAID Array controllers, follow these steps while referring to Figure 2–3 and Tahle 2–2:

1. Attach an H885-AA trilink connector to each HSZ50 controller on the SCSI bus segment.
2. Attach an H879-AA terminator to the H885-AA trilink connector on the HSZ50 controller that will be on the end of the SCSI hus segment.
3. If there are two HSZ50 controllers, connect the two H885-AA trilinks on the controllers with a BN21K (or BN21L) cable.
4. Connect the DS-DWZZH-05 UltraSCSI hub to the open H885-AA connector on the HSZ50 with a BN38C cable. The length of any SCSI hus segment must not exceed 25 meters.

Note

One end of the BN38C cable is 68-pin high density. The other end is 68-pin VHDCI. The DS-DWZZH-05 accepts the 68-pin VHDCI connector.

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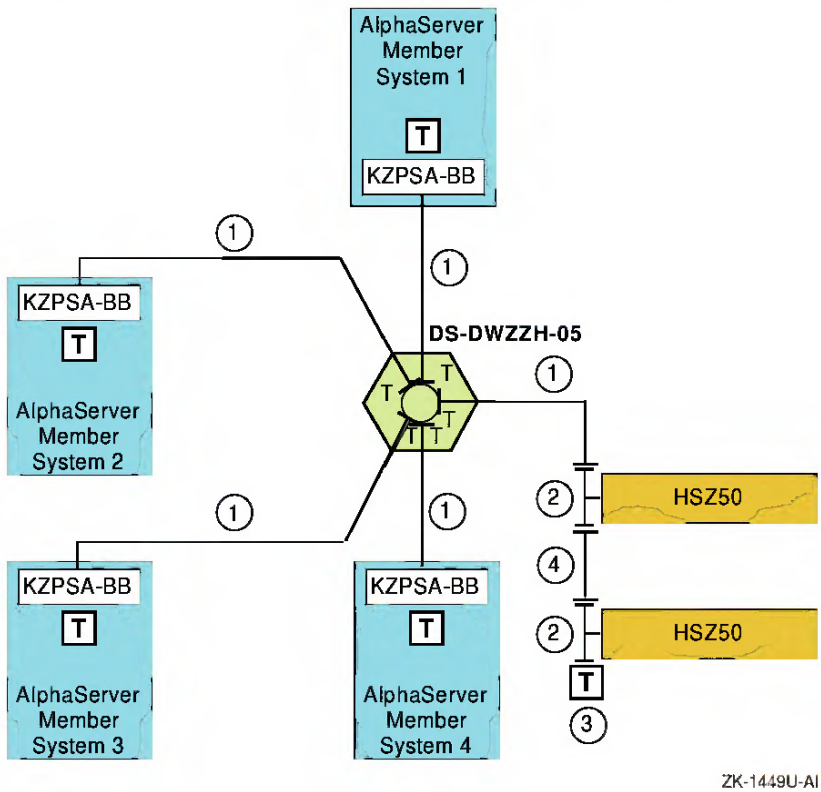
Figure 2–3 shows a sample configuration that uses KZPSA-BB SCSI adapters, a DS-DWZZH-05 UltraSCSI hub, and an HSZ50 RAID array controller.

Figure 2–3: TruCluster Configuration Using KZPSA SCSI Adapters, a DS-DWZZH-05 UltraSCSI Hub, and an HSZ50 RAID Array Controller



Note

The systems shown in Figure 2–3 use KZPSA-BB SCSI adapters. They could be KZPBA-CB UltraSCSI adapters without changing any cables in the configuration.

Table 2–2 shows the components used to create the cluster shown in Figure 2–3.

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Table 2–2: Hardware Components Used in the Configuration Shown in Figure 2–3

Callout Number	Description
1	BN38C HD68 to VHDCI cable[a] [b]
2	H885-AA HD68 trilink connector
3	H879-AA HD68 terminator
4	BN21K or BN21L HD68 cable[b]

[a]The maximum length of the SCSI bus segment, including BN38C cable and internal device length, must not exceed 25 meters.
[b]The maximum length of the SCSI bus segment, including the combined length of the BN38C and BN21K (or BN21L) cables, must not exceed 25 meters.

2.7.3.2 Cabling an HSZ70 to a DS-DWZZH-05 UltraSCSI Hub

To prepare the storage portion of a cluster using HSZ70 RAID array controllers, follow these steps while referring to Figure 2–4 and Table 2–3:

1. Install an H8861-AA trilink connector on each HSZ70 controller port on the SCSI bus segment.
2. Attach an H8863-AA terminator to the H8861-AA connector on the HSZ70 controller that will be on the end of the SCSI bus segment.
3. If there are two HSZ70 controllers, connect the two H8861-AA trilink connectors on the controllers with a BN37A cable.
4. Connect the DS-DWZZH-05 to the HSZ70 H8861-AA trilink with a BN37A cable.

Note

The maximum length of a SCSI hus segment, including cahle and internal device SCSI bus length must not exceed 25 meters.

Figure 2–4 shows a sample configuration that uses a KZPBA-CB SCSI adapter, a DS-DWZZH-05 UltraSCSI hub, and an HSZ70 RAID array controller.

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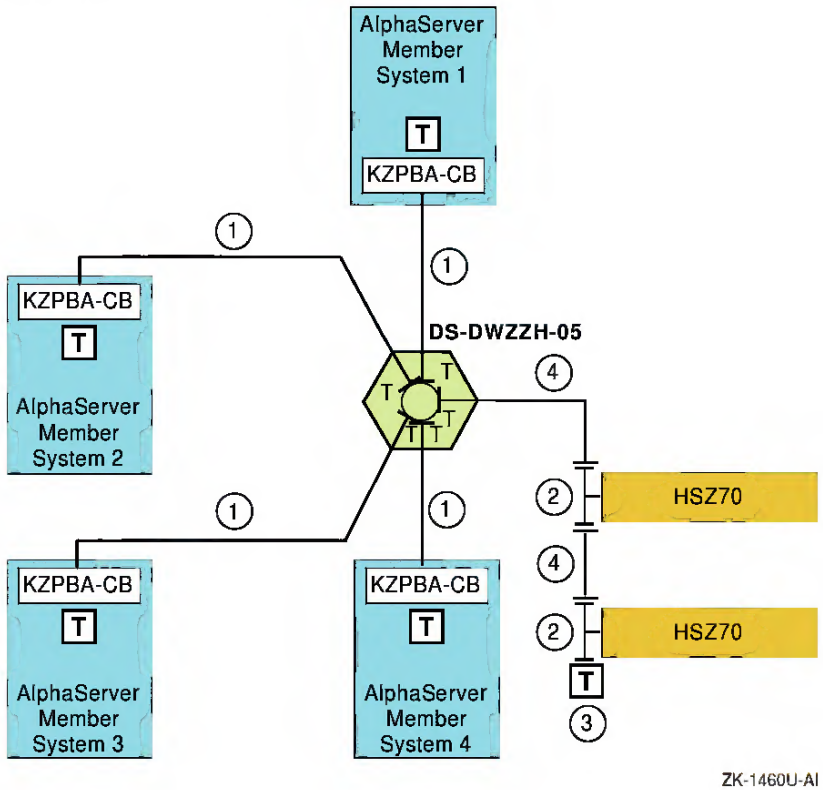
Figure 2–4: TruCluster Configuration Using a KZPBA-CB UltraSCSI Adapter, a DS-DWZZH-05 UltraSCSI Hub, and an HSZ70 RAID Array Controller



Note

The systems shown in Figure 2–4 use KZPBA-CB UltraSCSI adapters. They could be KZPSA-BB SCSI adapters without changing any cables in the configuration.

Table 2–3 shows the components used to create the cluster shown in Figure 2–4.

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Table 2–3: Hardware Components Used in the Configuration Shown in Figure 2–4

Callout Number	Description
1	BN38C HD68 to VHDCI cable[a]
2	H8861-AA VHDCI trilink connector
3	H8863-AA VHDCI terminator
4	BN37A VHDCI cable[b]

[a]The maximum length of the SCSI bus segment, including BN38C cable and internal device length, must not exceed 25 meters.
[b]The maximum length of the SCSI bus segment, including the combined length, of BN37A cables and internal device length, must not exceed 25 meters.

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